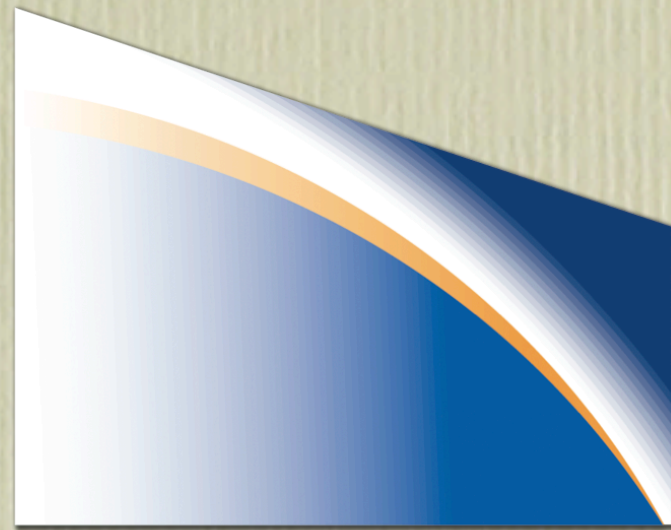


Three Years on the Grid

@



NCAR

Don Middleton

April 27, 2005; AccessGrid Retreat

Computational and Information Systems Laboratory
Scientific Computing Division

National Center for Atmospheric Research
Boulder, Colorado, USA

Thanks



Tim Schietlin, Darin Oman



Eron Brennan

What We Do

As a Program of the U.S. National Science
Foundation



Atmosphere



Hydrosphere

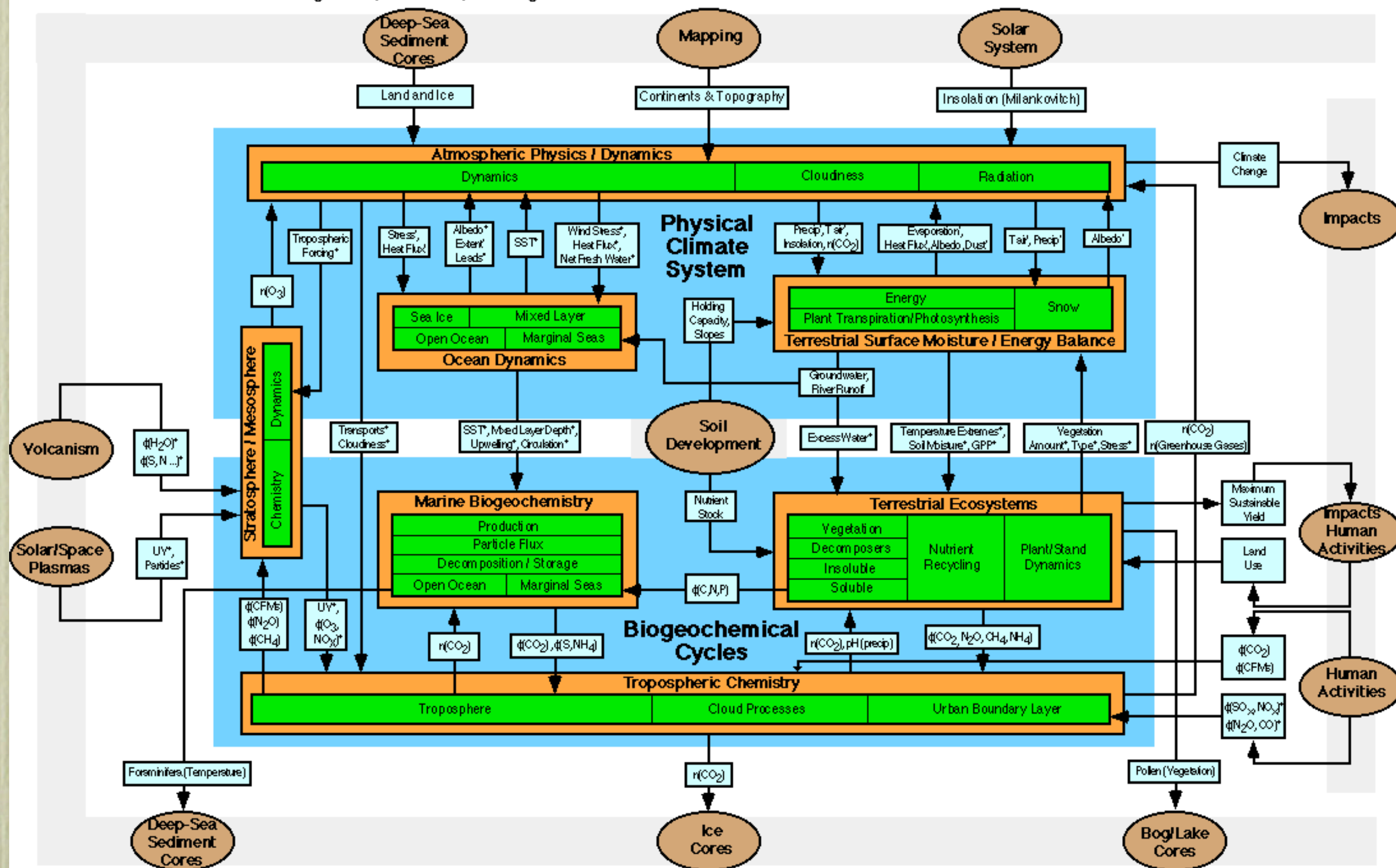


Cryosphere



Biosphere

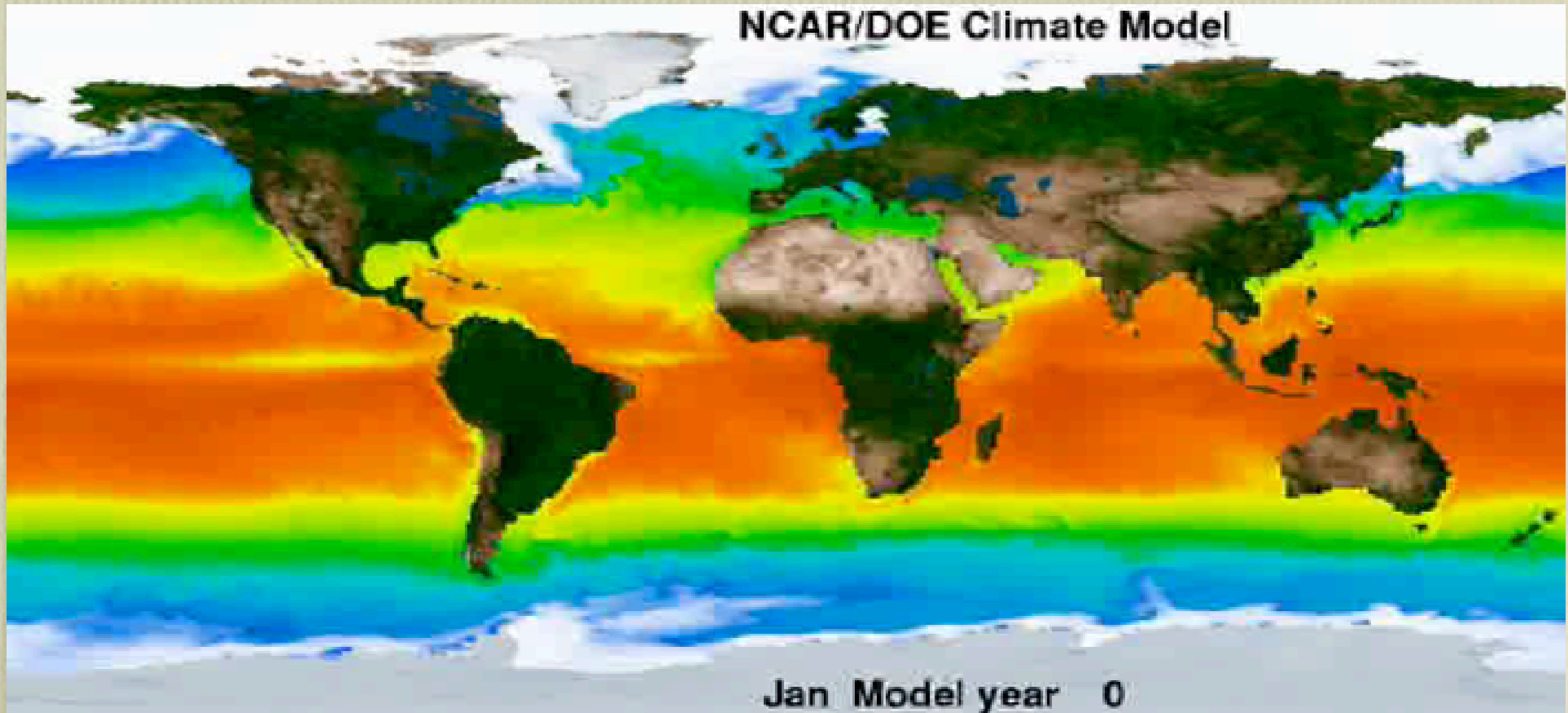
Earth System Research



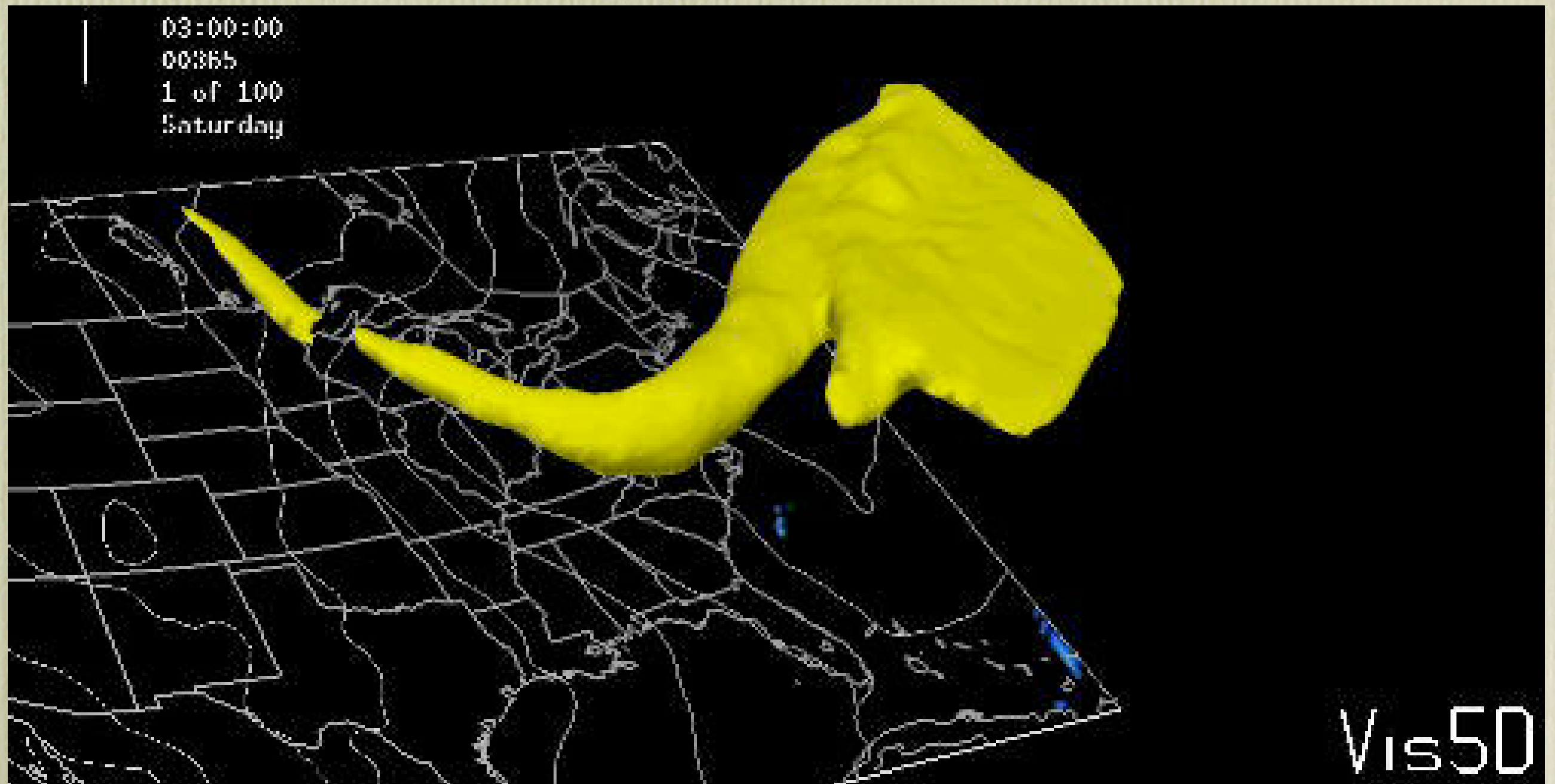
' = on timescale of hours to days * = on timescale of months to seasons ϕ = flux n = concentration

The Earth System

Global Climate Models

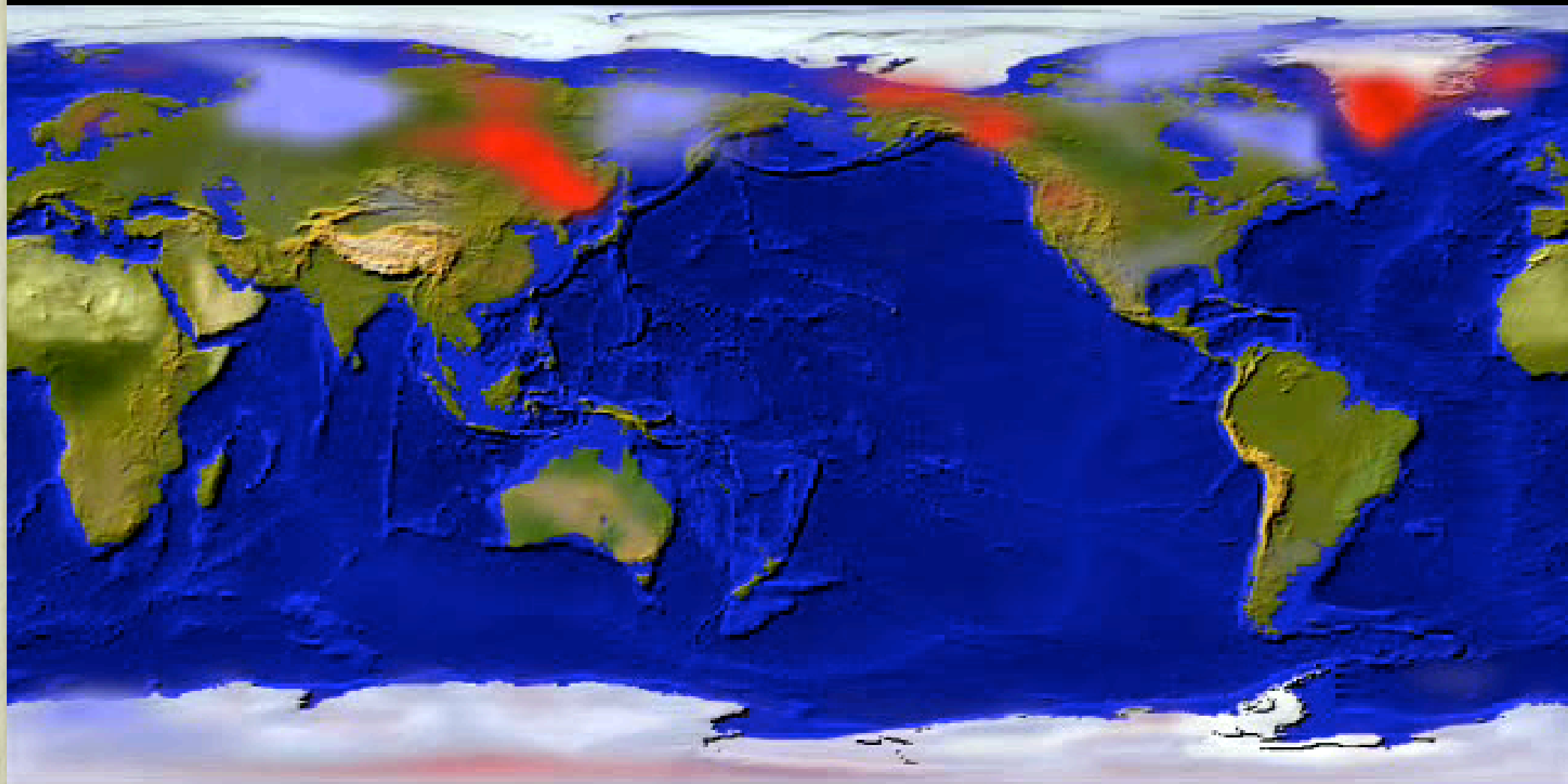


Weather Models



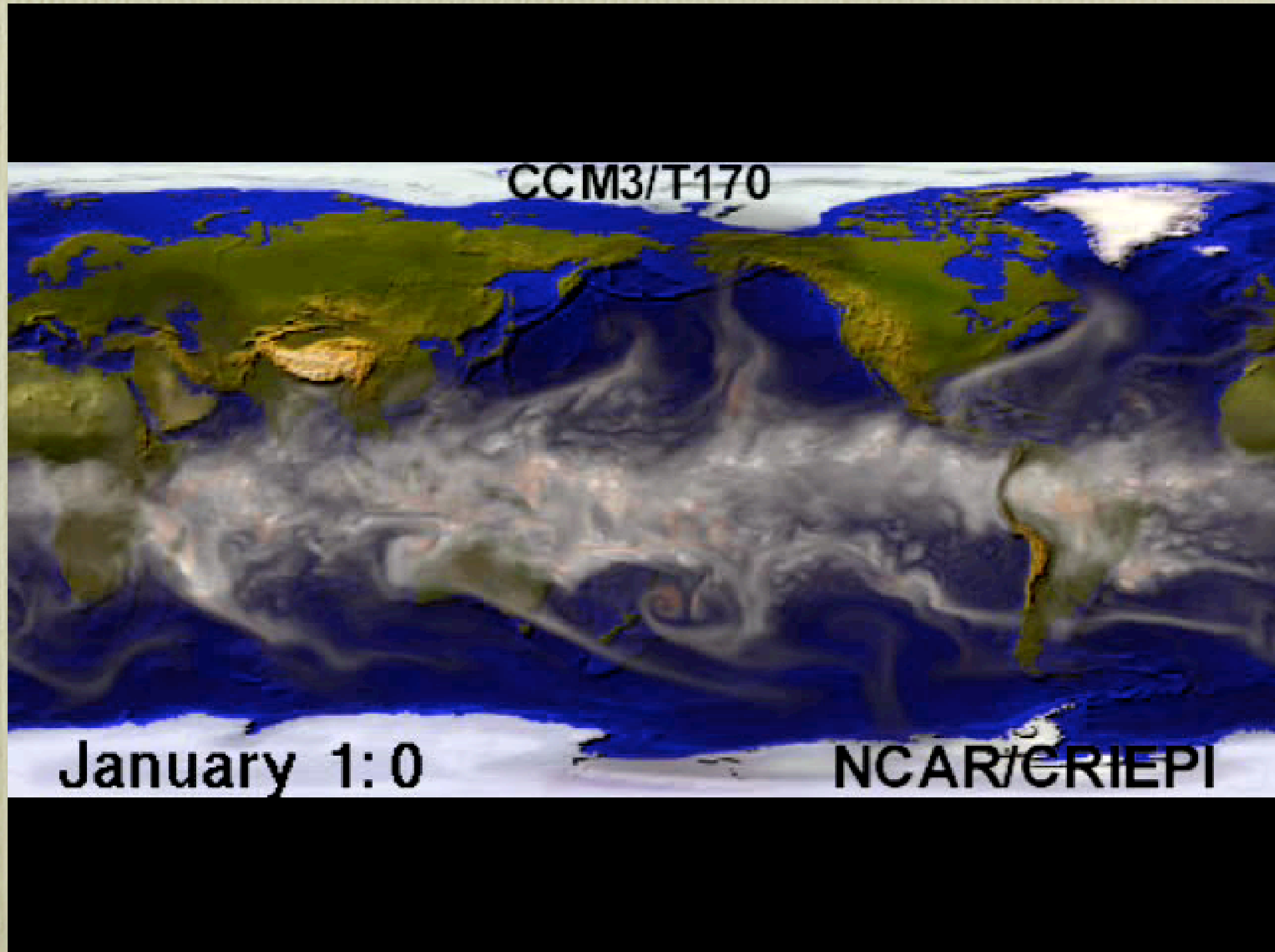
Atmospheric Chemistry

PCM – Transient CO₂ Experiment

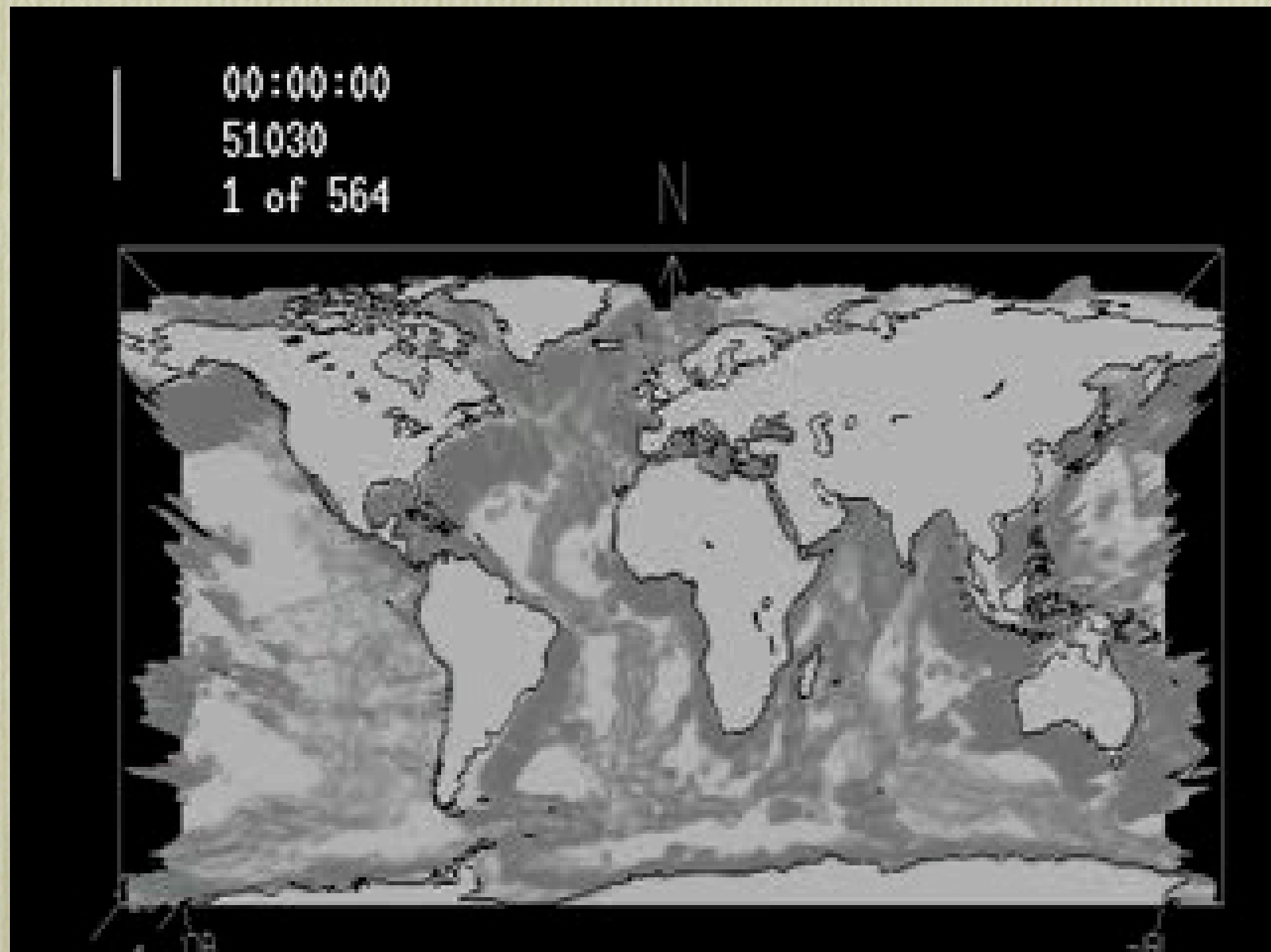


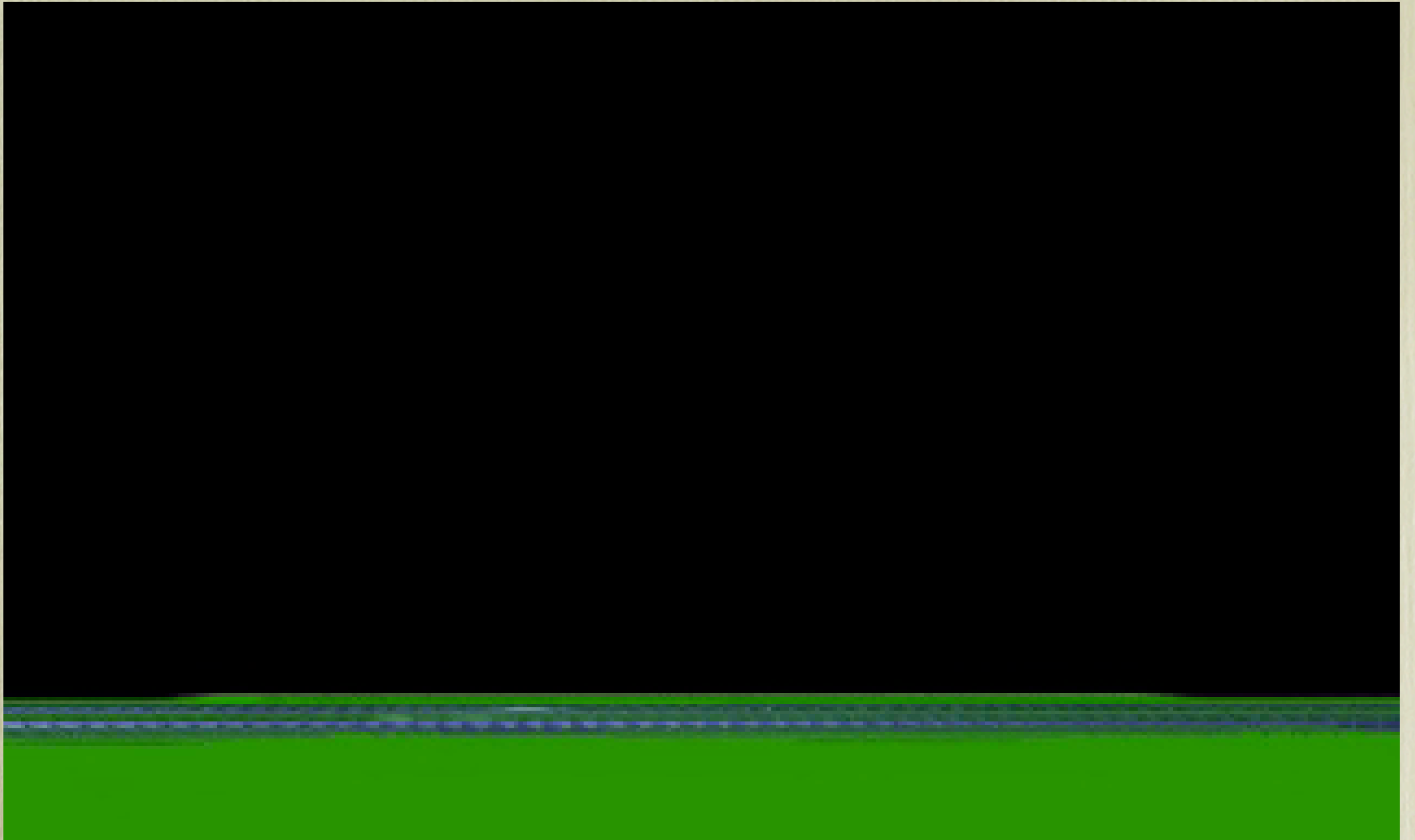
01/2000 Average = -0.06°C

Future Climate Models

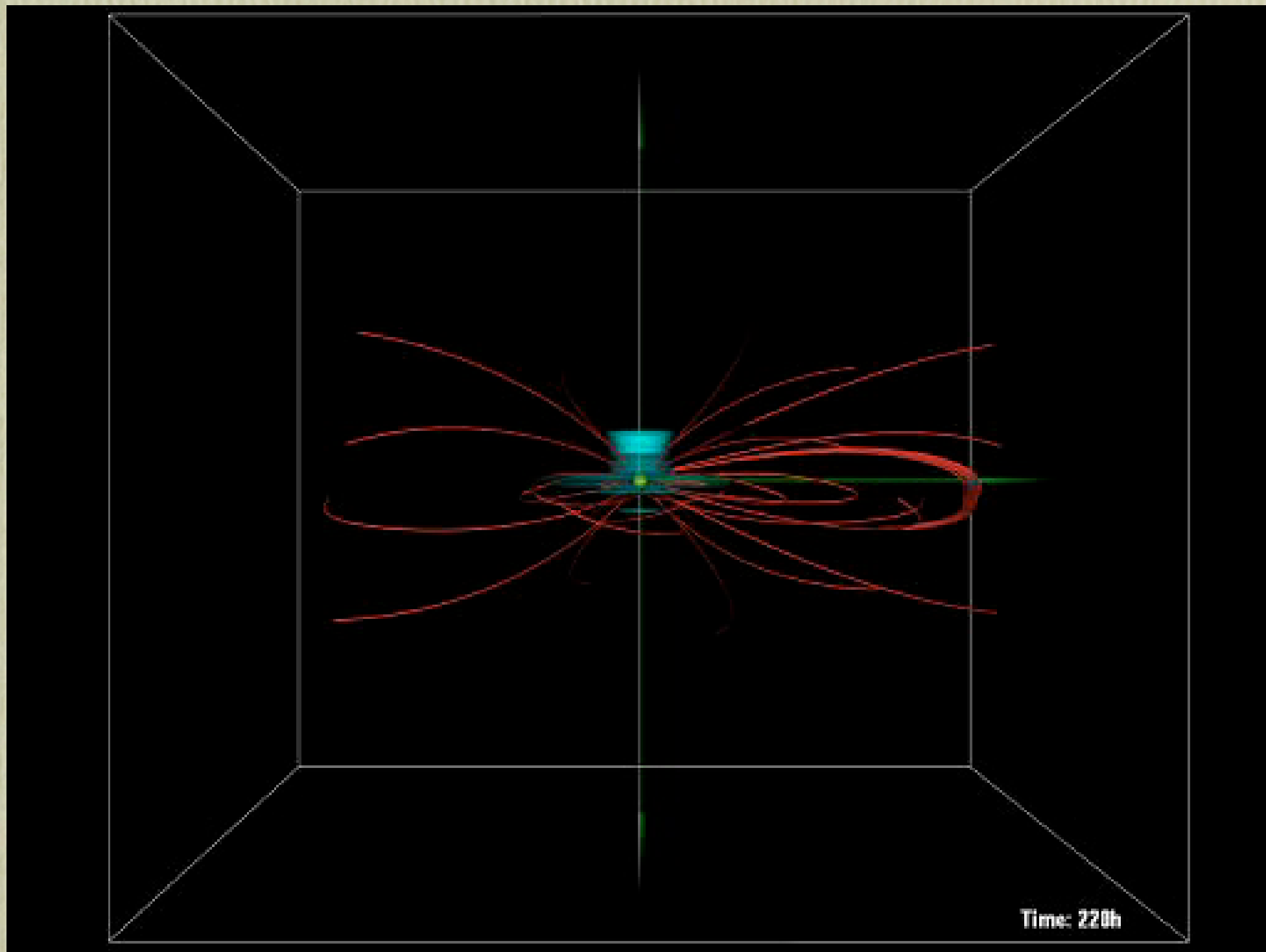


Oceans





Wildfires



Space Weather

Where We Do It

Boulder, Colorado, among other places...



In the beginning...
People came to our mountain



Foothills Lab



Center Green

Beginnings, and building a new Vislab...

In 2001



Vislab Build



2001: Building a New Vislab



Vislab Build



Vislab Build



A New Vislab



And Collaboration Facility

(Board of Trustees)

FY 2002 NCAR Director's Opportunity Fund



- *Establishing NCAR as the Virtual Center for Earth Science on the Access Grid*
- *Principal Investigators: Don Middleton (Coordinating) & Jeff Boote (Technical) NCAR/SCD*

▪ **Project Summary**

SCD is in the final stages of building its new Visualization Lab, a state-of-the-art facility that combines visual supercomputing with the AccessGrid (AG) collaboration environment (<http://www-fp.mcs.anl.gov/fl/accessgrid/>). The AG is a persistent, group-to-group collaboration infrastructure that is rapidly becoming adopted globally at universities, research centers, and in corporations. One can think of it as a "human scale" collaboration environment that effectively allows distributed *groups* of people to see, hear, and interact with each other while jointly experiencing electronically mediated presentations and, ultimately, applications (e.g. live data exploration). The AG operates over the broadband networks that connect us, such as Abilene for the universities, and ESnet for the DOE centers. With display surfaces ranging from a 3 to 10 meters wide, the "sense of presence" is strong. Live audio, video, and PowerPoint make the experience personal and information-rich. The images below show an AG at Ohio State along with a screen capture taken at Argonne National Labs.





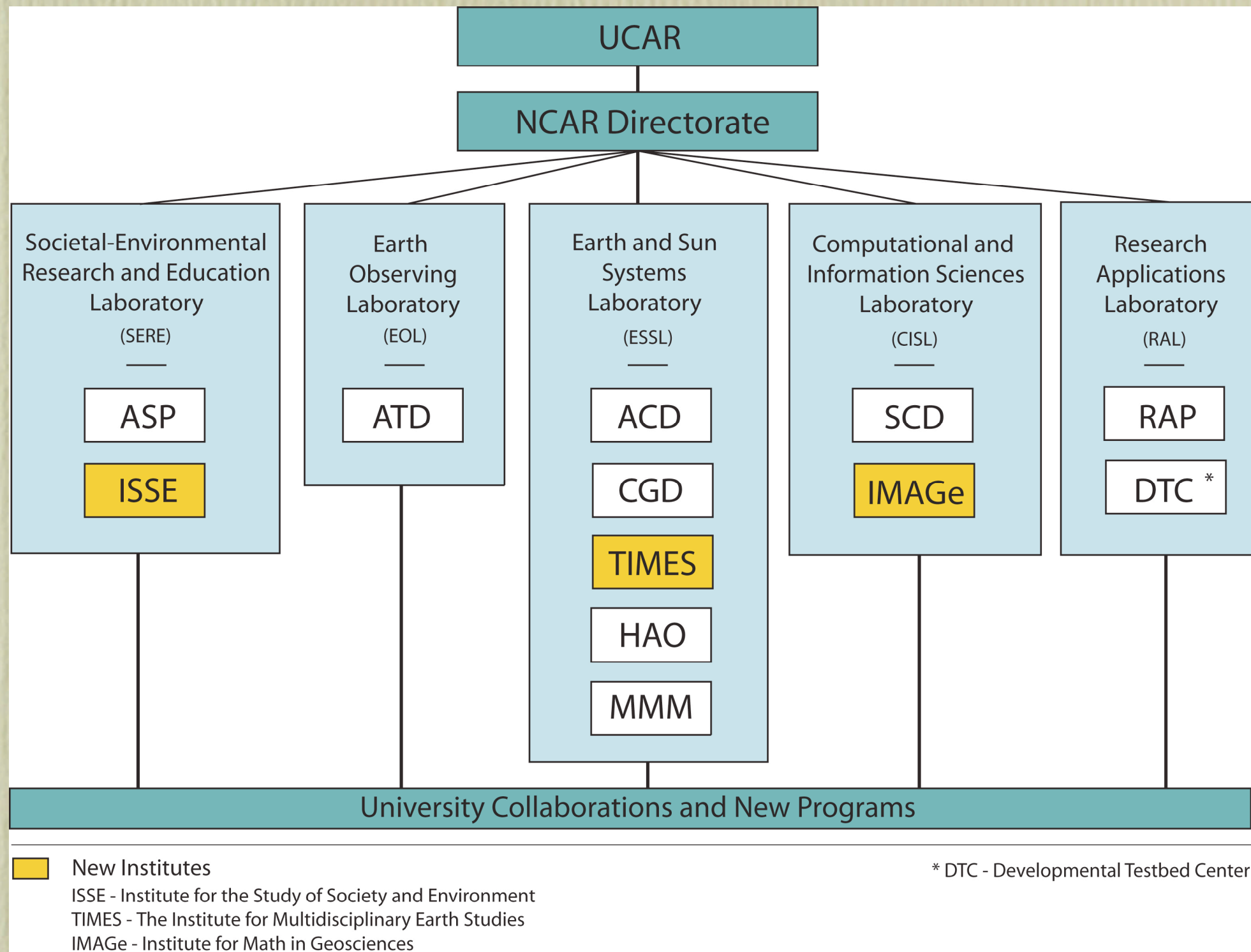
Thinking about possibilities



Global Science & Technology Week 2002

Acquire a Lot of Them

said our Director

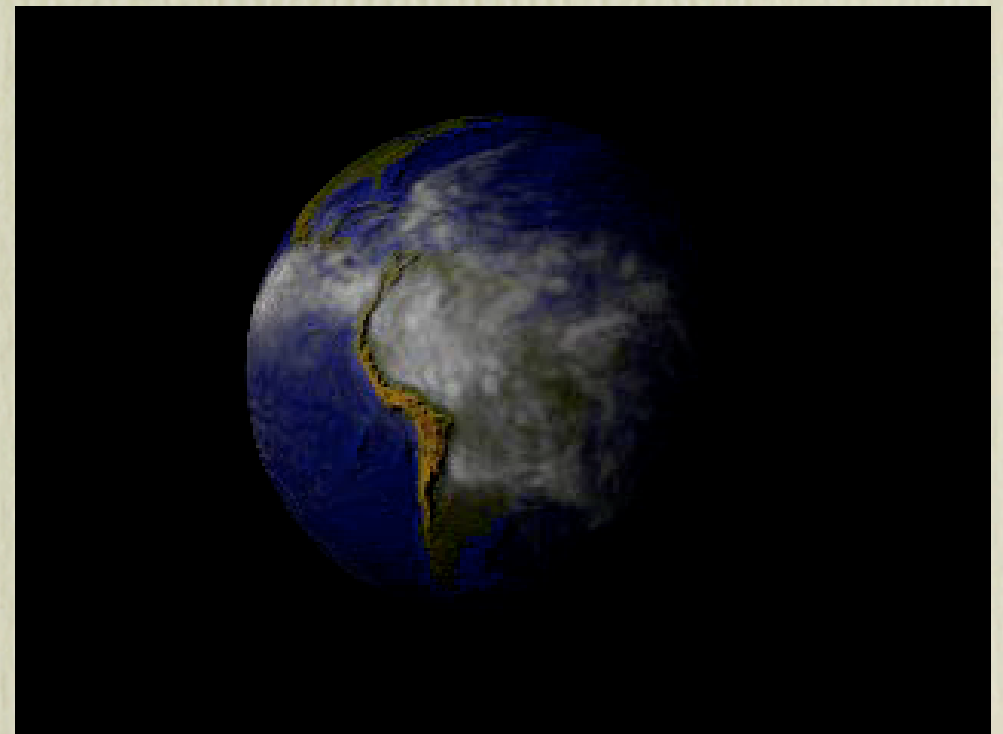
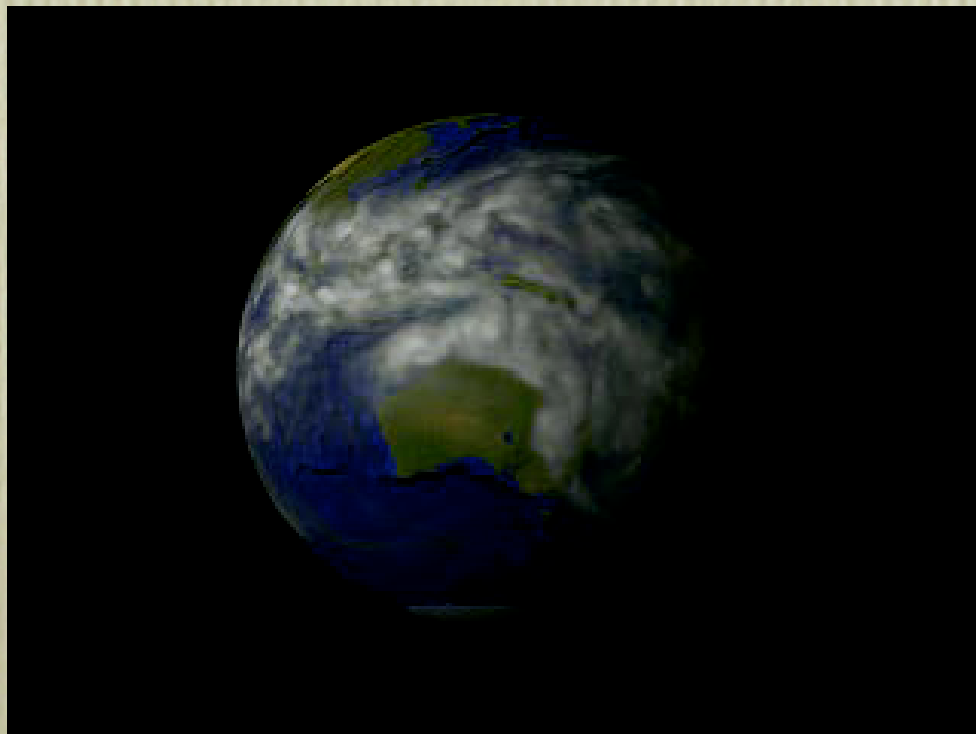


Institutional AG Deployment

2004

Building the Community Climate System Model

On the Grid



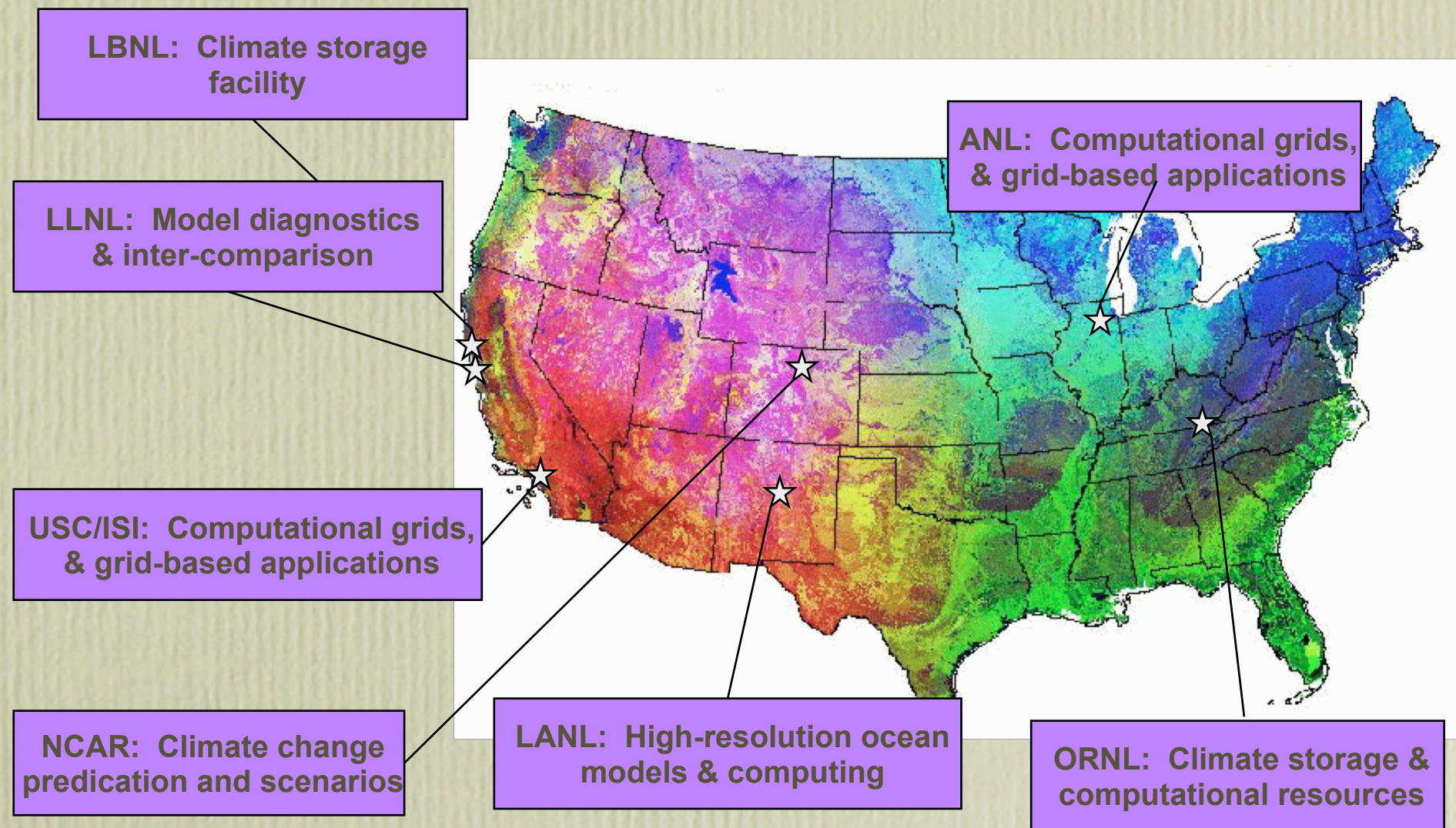


CCSM on the AG

Building the Climate DataGrid

On the Grid

The Earth System Grid



<http://www.earthsystemgrid.org>



Earth System Grid

ESG: An Operational DataGrid for Climate Research

Earth System Grid

https://www.earthsystemgrid.org/

Google

Apple Cycling DataVis Events XTech Media NCAR News Personal WeatherTravel

Earth System Grid

Home Data About ESG Login

ESG News

Registration is required to download some of the data, please [request](#) an account. Please [send us](#) comments or feedback.

New: [IPCC Working Group 1 data](#) available.

The [NCAR MSS](#) is scheduled for downtime each Sunday morning from 0000-0230 MST.

The [NERSC HPSS](#) is scheduled for maintenance downtime from 7-12 PST every Tuesday morning.

The [ORNL HPSS](#) is scheduled for downtime every other Wednesday morning from 8-12 EST. **NOTE: data download from ORNL HPSS has been temporarily disabled.**

Data Search

Search Dataset metadata for:

Examples: c02, B06.77

Browse Dataset Catalogs

- [CCSM \(Community Climate System Model\)](#)
- [PCM \(Parallel Climate Model\)](#)

Welcome to ESG

The Earth System Grid (ESG) integrates supercomputers with large-scale data and analysis servers located at numerous national labs and research centers to create a powerful environment for next generation climate research. This portal is the primary point of entry into the ESG.

ESG Collaborators

- [Argonne National Laboratory](#)
- [Lawrence Berkeley National Laboratory](#)
- [Lawrence Livermore National Laboratory](#)
- [Los Alamos National Laboratory](#)
- [National Center for Atmospheric Research](#)
- [Oak Ridge National Laboratory](#)
- [University of Southern California/Information Sciences Institute](#)

Funded by the U.S. [Department of Energy](#)

ESG Current Status

Updated: Tue Jan 11 14:10:01 2005 MDT

	LBNL	NCAR	ORNL
MSS/HPSS	☺	☺	☺
SRM	☺	☺	☺
RLS	☺	☺	☺
OpenDAPg		☺	

([Explanation](#) of current status)

Web Portal software version 3.0
© 2004, UCAR. All rights reserved.

Login Status: Not logged in.

Problem using site?
[Contact ESG](#)



ESG Meetings

ESG Metrics

- Two portals: US Climate Models and the Intergovernmental Panel on Climate Change (IPCC)
- CCSM/PCM Site: 620 registrations, 500 approvals, 578 datasets, 350K files, 50TB of data, 1.5TB's downloaded
- IPCC Site: 293 registrations, 44.3K files, 18.7TB of data, 24.1TB downloaded
- **Approx. Totals:** 800 registrations, 70TB of data, 400K files, 4 data sites, 26TB downloaded, *in 6-9 months of operation*

Building the Next Generation of Scientists

On the Grid



SOARS Proteges 2004

Significant **O**pportunities in the
Atmospheric & **R**elated **S**ciences



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[SCD News](#) > Feature: 22 July 2004

SOARS goes high-tech with SCD

AccessGrid allows protégés in Boulder, Oklahoma, and Puerto Rico to meet with each other — virtually



Amber Reynolds, live from Oklahoma, presents preliminary research results to her peers in Boulder over the AccessGrid on 22 July 2004.



Atzel Drevon, leg in a cast, gives a talk on his research methodology to SOARS

This summer, SCD helped two students in the Significant Opportunities in Atmospheric Research and Science (SOARS) program give face-to-face presentations to their peers and mentors — even though they were thousands of miles away.

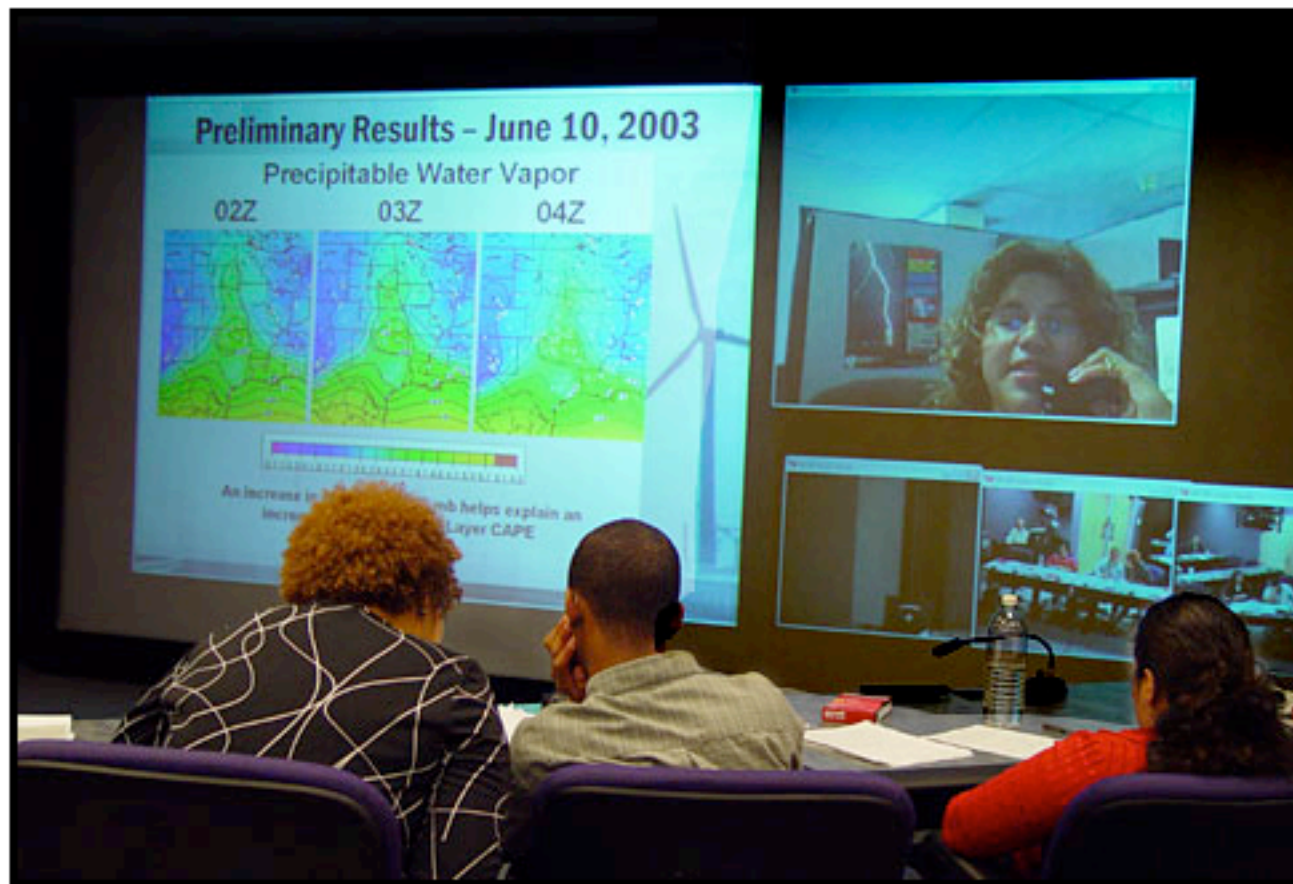
Three days before SOARS protégé Atzel Drevon was set to fly to Boulder from Puerto Rico, he broke his leg. After undergoing surgery, he received doctor's orders not to travel for six weeks. Meanwhile, Amber Reynolds, a third-year SOARS protégé, was gaining valuable experience working offsite at the National Severe Storms Laboratory in Norman, Oklahoma.

But through the magic of the AccessGrid, both were able to attend the 24 June 2004 SOARS seminar in which protégés defended their summer research proposals.

[Darin Oman](#), a Visualization Lab operator in SCD's Visualization and Enabling Technologies Section (VETS), spent hours on the phone with each of them, setting them up for a virtual meeting over the AccessGrid. The AccessGrid uses multicast technology to allow people in different locations to see, hear, and speak to each other in real time.

"Atzel was already technically enabled," says SOARS director Raj Pandya. "He had a SWIKI [collaborative web technology], a webcam, the ability to do conference calls. Nevertheless, it wasn't an easy thing to arrange — I'm guessing that not a lot of people are trying to connect to the Grid from their home laptops. Darin had to find a way to make the data feed work. He discovered a software package from that worked over a cable modem; he researched mikes, picked them up at the store, and mailed them out — he did an amazing job."

At the June seminar, Atzel and Amber were able to defend their proposals, listen to presentations, and participate in Q&A with the other protégés — and Atzel even showed off his cast.



SOARS protégé **Amber Reynolds**, speaking live from Oklahoma, explains the preliminary results of her research at the National Severe Storms Laboratory to the SOARS audience in Boulder on 22 July 2004. The AccessGrid makes it possible for people at different locations to see, hear, and speak with each other using multicast technology.

Photo: Lynda Lester, NCAR/SCD

 [Back](#)



SOARS protégé **Atzel Drevon** presents the methodology and preliminary results of his summer research to SOARS protégés at a seminar on 22 July 2004. SCD's Darin Oman, rear, monitors the AccessGrid.

Photo: Lynda Lester, NCAR/SCD

 [Back](#)

And Building Community

Along the way



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UNIVERSITY

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**Howard First College to
Receive NAB's Spirit of
Broadcasting Award**



**President and Provost
Join in Faculty Awards
Presentation**
Thursday, April 28

Howard University



Howard University



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UCAR *Quarterly*

Winter 2004-05

Face time across the miles

Virtual meetings come of age with Access Grid, improved webcasts

by Bob Henson

If you couldn't make it to Boulder for the seminar by Howard Bluestein (University of Oklahoma) on 17 November—or if you live in Boulder, but you missed it—all is not lost. Bluestein's talk on mobile Doppler radars and tornadoes is one of several NCAR seminars now available through archived [webcasts](#).

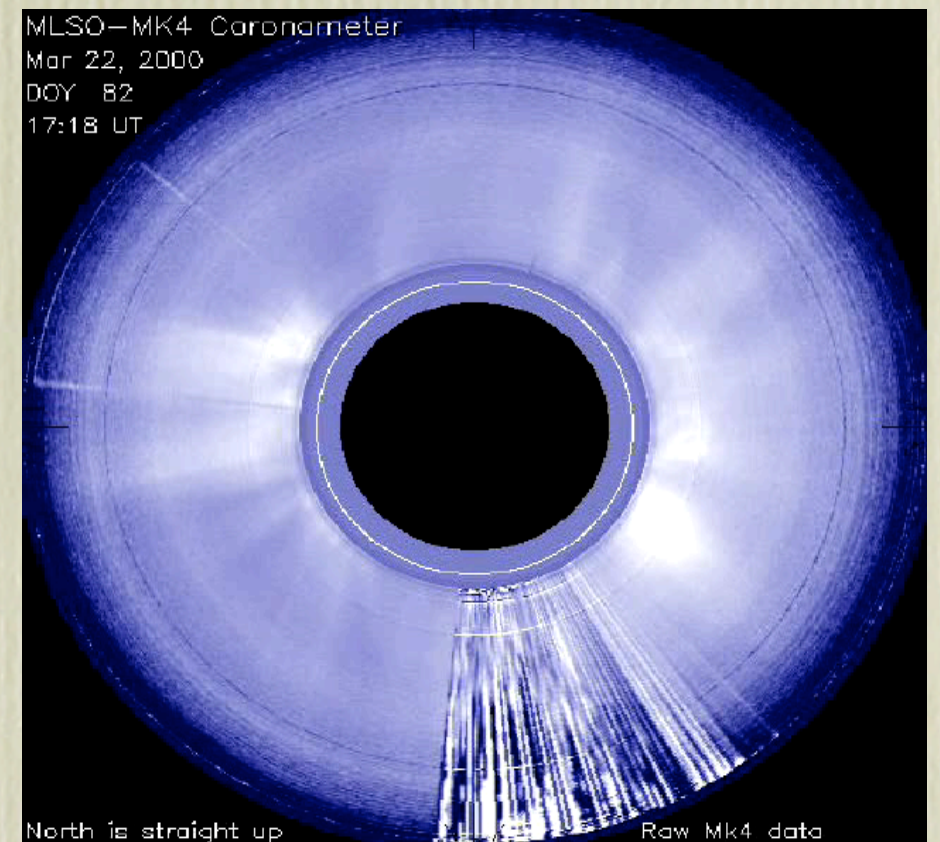
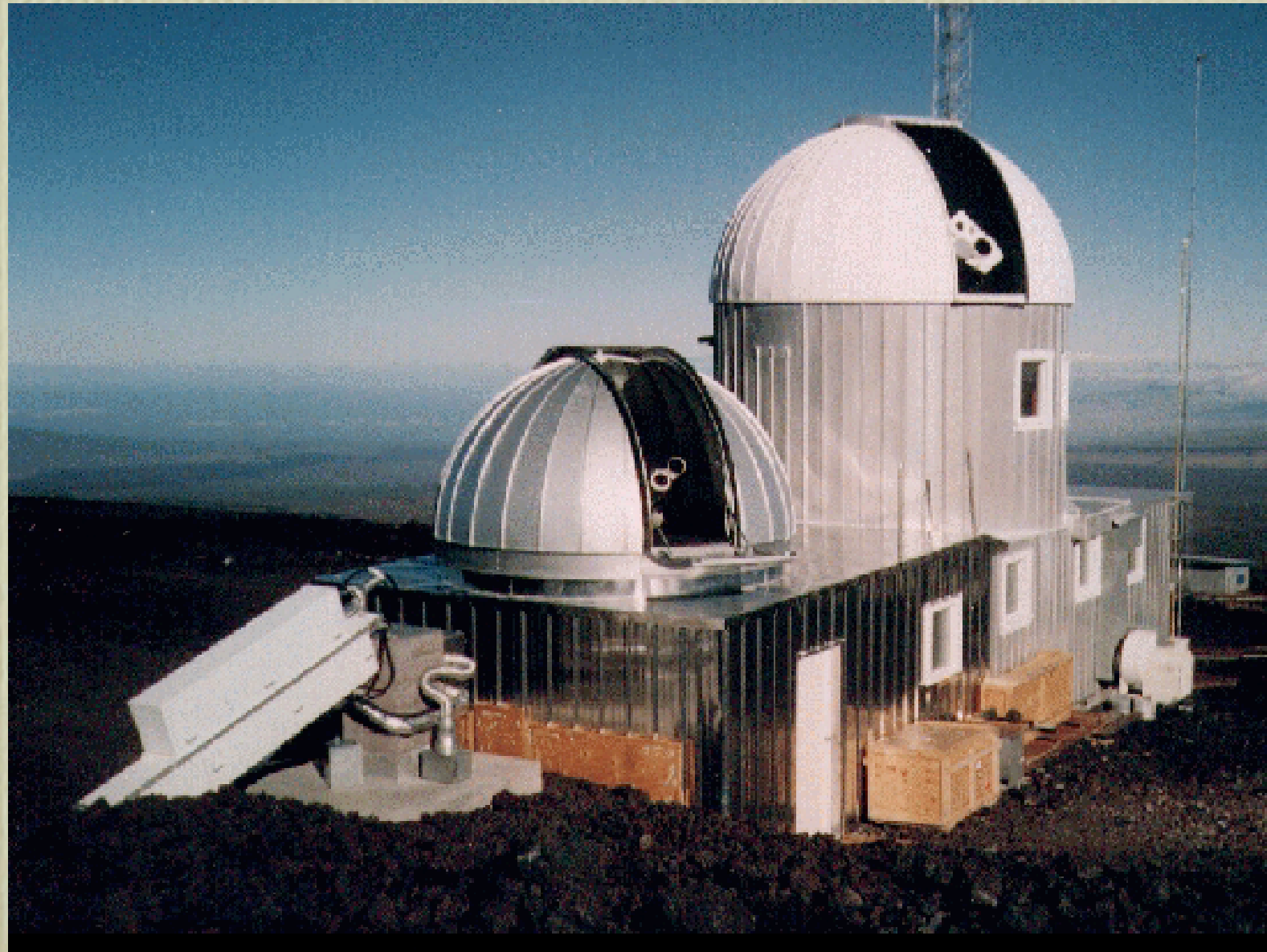
A confluence of bandwidth and better software has brought the promise of virtual scientific interaction down to earth. Jerky videos and fuzzy PowerPoint slides are giving way to smoothly coordinated audiovisual fare. The steady growth of the Access Grid is allowing several UCAR members to collaborate in multi-site meetings that are truly interactive.

Seminars on line

At the UCAR members meeting last October, the attendees asked NCAR to explore collaboration options through Access Grid and video conferencing techniques and by webcasting its many seminars. Now, with a high-priority mandate and support from NCAR director Tim Killeen, these technologies are proliferating.

When a seminar is chosen for webcasting, the speaker is videotaped and

And other mountains...



VSTO: The Virtual Solar-Terrestrial Observatory

- VSTO is a collaborative project among
 - NCAR's High Altitude Observatory
 - NCAR's Scientific Computing Division
 - Stanford's Knowledge Systems Lab
- VSTO is funded by a grant from the National Science Foundation, Computer and Information Science and Engineering (CISE) in the Shared Cyberinfrastructure (SCI) division.

VSTO

The prototype Virtual Solar-Terrestrial Observatory (VSTO) is a distributed, scalable education and research environment for searching, integrating, and analyzing observational, experimental and model databases in fields of solar, solar-terrestrial and space physics.

- Next generation data system aimed at integrating a dozen or so current generation ones
- Formal incorporation of knowledge/semantics: ontologies, reasoning engines



NCAR Research Aviation Facility

HIAPER Flyby

Jeffco Airport
3-11-05

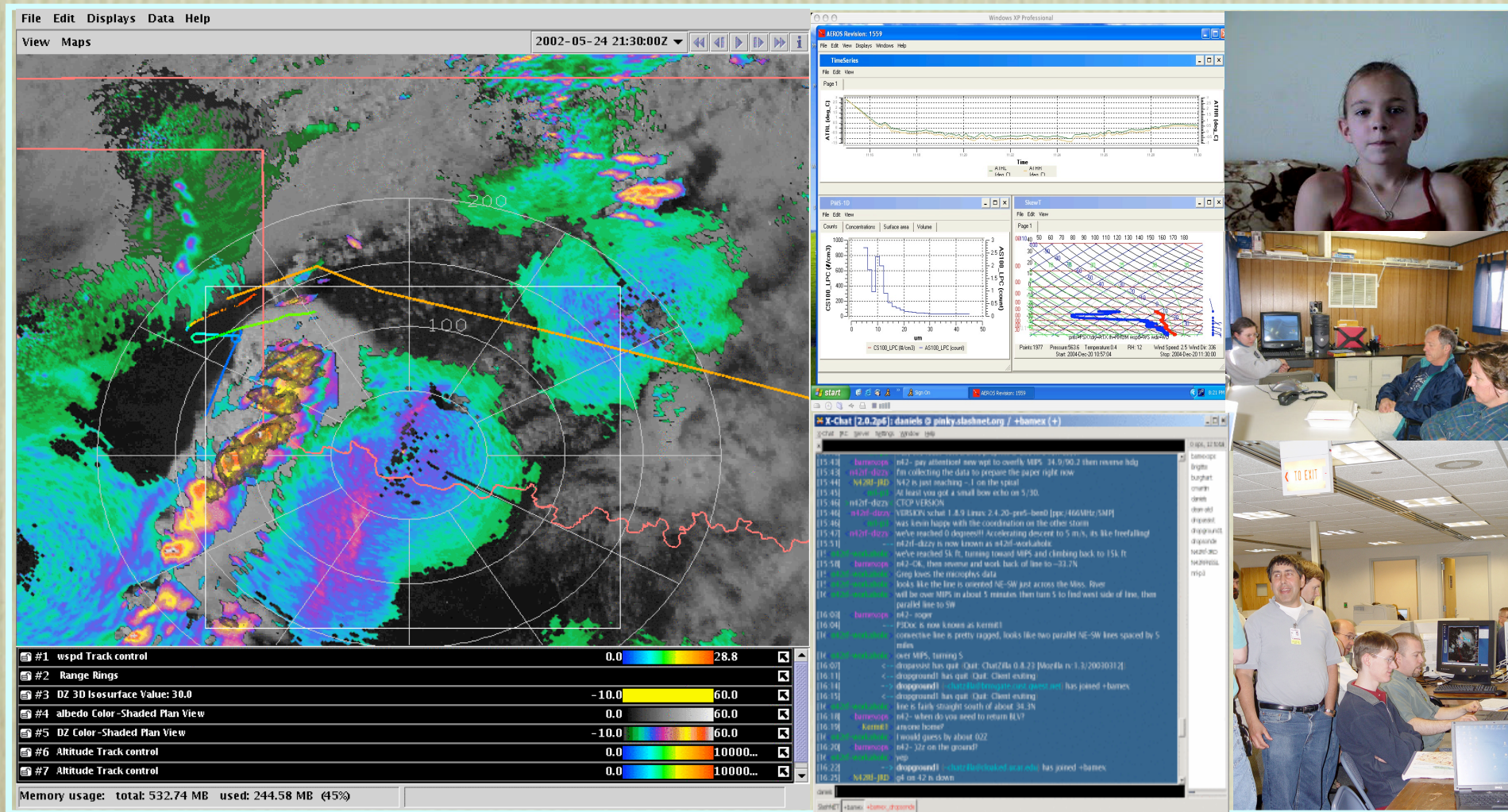
A New Arrival



HIAPER

High-performance Instrumented Airborne Platform for Environmental Research

Future AG Environment for Aircraft and Field Programs



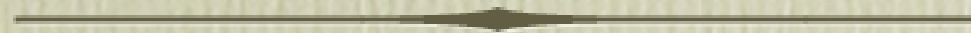
Courtesy of Mike Daniels, NCAR's Earth Observing Lab

Challenges

- Spontaneity
- Multicast, Firewalls
- Complexity and ease-of-use
- Integration of Tools of Practice
 - Whiteboards, visualization
- Deployment for more collaborative projects
- ***Funding!***

“I was trying to use our AG yesterday and found out that all AG administrators are participating in the AG Retreat in San Francisco. As a result, we couldn’t get our AG to work. May not have any bearing on our meeting this week...”

Success?



End

